Dietary Antioxidants and Asthma Risk

Antioxidant constituents of diet decrease **risk of asthma**.

General Information	
Broad Focus Area	Asthma
Background and Justification	Interest in the relation between dietary antioxidant consumption and risk of asthma arises from several directions. First, general population-based health surveys have demonstrated modest direct associations between pulmonary function and antioxidant consumption and serum levels.[1,2] Second, markers of oxidative damage are found at higher concentrations in the exhaled breath condensate of children with asthma compared to those without asthma, while markers of antioxidant status are higher among children without asthma.[3] Third, the deleterious pulmonary response to ozone exposure is somewhat modified by oral administration of Vitamins C and E.[4,5] Pulmonary inflammatory response to ozone exposure is thought to be mediated at least in part by oxidative damage to airway tissues. Little direct evidence exists, however, concerning the relationship between antioxidant consumption or serum levels and the development of asthma, especially in relation to exposure to potential oxidative stressors such as ozone, nitrous oxides, or environmental tobacco smoke. In addition, examination of the temporal relationship between antioxidant consumption on subsequent outcome and assessment of genetic variation in immunologic response to oxidative stress and the potential modifying influence of antioxidant exposure will be important in understanding potential intervention techniques, whether related to asthma incidence or treatment.[6]
Prevalence/ Incidence	Nine million children less than 18 years of age are estimated to have asthma.[7] Among children, it is the most common chronic illness.[8] The prevalence of asthma increased from 35 to 62 per 1,000 children aged 0 to 17 years between 1980 and 1996.[9] Exposure to bioaerosols and outdoor air pollution is ubiquitous but varies by location and time.
Economic Impact	In 1997, the annual estimated cost of pediatric asthma in the US was $6.6 billion.[10] By 2002, the total cost of asthma was estimated at $14 billion.[11] The more severe forms of asthma account for a disproportionate amount of the total direct costs; one study estimated that less than 20% of asthmatics account for over 80% of the direct costs.[12] Asthma also poses a substantial and increasing public health burden in lost time from school and usual activities and in health care utilization.

Exposure Measures			Outcome Measures	
Primary/ Maternal	Antioxidant consumption and antioxidant levels		***Primary/ Maternal***	
Methods	Interview/questionnaire (diet/nutrition assessment, vitamin use); blood samples; urine samples; breast milk		Methods	
Life Stage	Prenatal through infancy		Life Stage	
Primary/Child	Antioxidant consumption		***Primary/Child***	Decreased risk of asthma

	(maternal and child) and antioxidant levels			measured via allergy; asthma in index child; airway reactivity
Methods	Urine samples; blood samples; interview/questionnaire (diet/nutrition assessment, vitamin use)		Methods	Direct observation by medical professional; medical record review; interview/questionnaire; blood samples; urine samples
Life Stage	Periodic, 0-3 months to year 20		Life Stage	Periodic, birth to year 20

Important Confounders/Covariates	
Vitamins	Vitamin C at levels of 60/mg/day for nonsmokers and 100/mg/day for smokers may have a protective effect; there are still several unresolved questions.[13,14]
Smoking	Smoking, which is related to higher levels of oxidative stress, may reduce the effect of an antioxidative diet [13,15]
Red wine, apples	Red wine and apple consumption (in adults) was negatively associated with asthma severity (OR = 0.89) This may suggest a protective effect of flavonoids. [16]

Population of Interest		Estimated Effect that is Detectable
All children		The smallest detectable relative risk is approximately 1.2. This power estimate assumes a sample size of 100,000 at age of diagnosis, an asthma incidence of 5%, and a cut-off value for "high" exposure based on the upper 5th percentile of NCS subjects (i.e., a proportion exposed of 0.05). It assumes only a main effects model based on exposure to a single factor (e.g., a single pollutant) without consideration of interactions with other exposures, genetics, family history, etc.[17]

Other Design Issues	
Ethical/Burden Considerations	Blood studies, especially fasting, in younger children will require careful attention.

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